**Question 1:**

**(a)[8]** Use matrix reduction to solve the following system of equations:

$$\begin{aligned} 6x + y &= 8 \\ x - 3y &= -5 \\ 2x + y &= 2 \end{aligned}$$

**(b)[2]** Is the system of equations in (a) consistent or inconsistent?

**Question 2:** For this problem use the following matrices:

$$\mathbf{A} = \begin{bmatrix} 1 & 0 \\ 2 & 4 \\ -1 & 2 \end{bmatrix} \quad \mathbf{B} = \begin{bmatrix} 4 & -3 & 0 \\ 1 & 1 & -2 \end{bmatrix} \quad \mathbf{C} = \begin{bmatrix} 3 & -4 \\ 1 & 4 \\ 5 & -2 \end{bmatrix} \quad \mathbf{D} = \begin{bmatrix} -6 \\ 1 \end{bmatrix}$$

**(a)[4]** Compute $(3\mathbf{A} - 4\mathbf{C})\mathbf{D}$

**(b)[4]** Compute $\mathbf{AB} - 3\mathbf{I_3}$

**(c)[2]** Suppose there is some matrix $\mathbf{P}$ such that the product $\mathbf{BPA}$ is defined. What must be the dimension of the matrix $\mathbf{P}$?

**Question 3:**

**(a)[7]** Determine $\mathbf{A}^{-1}$ where $\mathbf{A}$ is the matrix

$$\begin{bmatrix} 1 & -1 & 0 \\ -1 & 2 & 3 \\ 1 & 0 & 2 \end{bmatrix}$$

**(b)[3]** Use your result in part (a) to solve the following system of equations:

$$\begin{aligned} x - y &= -3 \\ -x + 2y + 3z &= -1 \\ x + 2z &= 7 \end{aligned}$$

**Question 4 [10 points]:** A certain animal requires at least 30 grams of protein and 20 grams of fat each feeding. Two foods are available: food A costs \$0.18 per unit, and each unit supplies 2 grams of protein and 4 grams of fat. Food B costs \$0.12 per unit, and each unit provides 6 grams of protein and 2 grams of fat. At least 2 units of food B must be used each feeding. How many units of foods A and B should be used each feeding to minimize cost?

Graph paper is provided on the next page. Carefully set up the problem, neatly sketch any required graphs and state a clear conclusion.

**Question 4 (continued)**